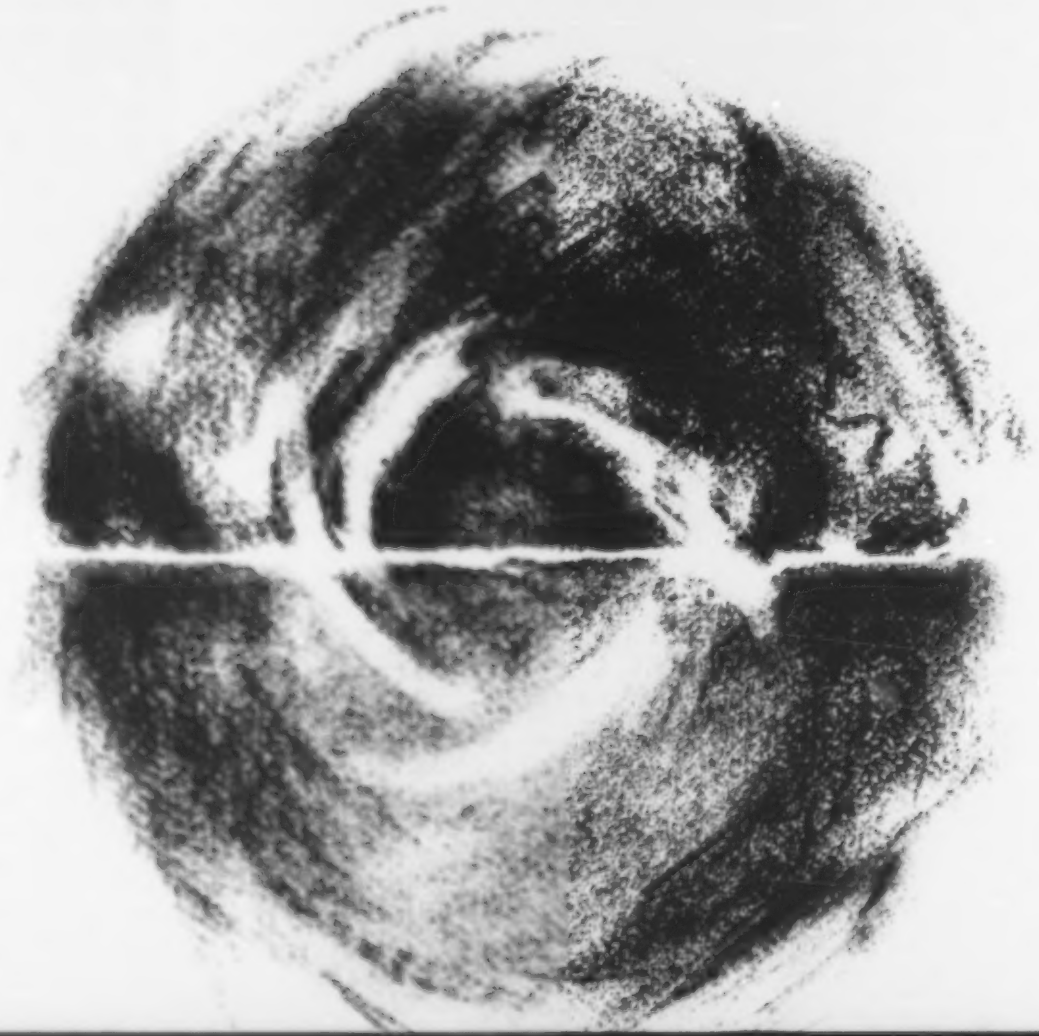
SASKATCHEWAN ROUND TABLE
ON ENVIRONMENT AND ECONOMY

Conservation Strategy for Sustainable Development in Saskatchewan

DRAFT 1991



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Key Recommendations

1. The Saskatchewan Government must give an independent body the mandate to monitor and report to the public on the progress made in implementing the Conservation Strategy.

2. We must improve our decision-making ability by creating integrated resource management systems and seeking meaningful public participation. This is the only way to ensure that final decisions are compatible with the concept of sustainable development.

3. We must implement a comprehensive strategy to protect and rehabilitate our soil resources.

4. Saskatchewan must have comprehensive strategies to:
   - manage our water resources
   - develop a sustainable energy path
   - apply ecological principles to the management of our forests
   - minimize and manage wastes

5. We must maintain and enhance Saskatchewan's biological diversity.

6. We must increase the longevity of our non-renewable resources by ensuring that minerals are mined and used in an environmentally and economically acceptable way.

7. Individual commitment and participation of all Saskatchewan residents are essential in creating a sustainable future for the Province.

Preface

Saskatchewan has been blessed with an abundance of natural resources. However, in 100 years of settlement in the province, our natural resources have been degraded. We believe that we are borrowing our Province's natural resources from our children. We must pass them on to them in the best possible condition.

If this is to be achieved, we must change our ways. The Saskatchewan Round Table on Environment and Economy recognizes that the environment and the economy are completely interconnected. To have a healthy economy, we must maintain a healthy environment. We are also better able to make wise environmental choices if our economy is healthy.

The draft Conservation Strategy is intended to outline the pathway toward a sustainable future for our Province. It is presented to the people of Saskatchewan for consideration and comment before a final presentation is made to the Premier and Cabinet.

The Conservation Strategy will be a meaningless document if it does not have the support of Saskatchewan's people. Your comments or criticisms can only improve our document. Please participate fully and share your concerns and hopes for Saskatchewan's future with the Round Table. Many individuals and organizations have already been involved in the advisory group process. We wish to thank these people for their extremely helpful input to this strategy.

There are several ways to participate in the review of the draft Conservation Strategy. Public meetings will be held in several locations this fall. These meetings will give you an opportunity to meet Round Table members and to discuss the Conservation Strategy with them. If you are unable to attend any of the public meetings, please send your comments to:

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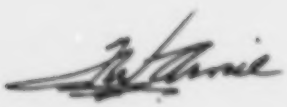
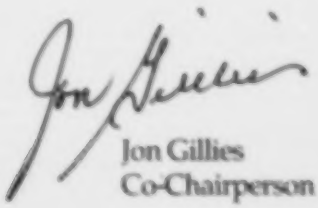


Frank Arnie
Co-Chairperson



Jon Gillies
Co-Chairperson

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Geographic Setting

Saskatchewan consists of an area of 651,903 square kilometres, of which 81,632 square kilometres are covered by water. About 90 per cent of this water is found in the north of the Province.

Two dominant landscape types are found in the Province. Grassland vegetation is dominant in the southern half of Saskatchewan. In contrast, the northern half of the Province is forested. A transition zone called the Parkland belt separates the grassland and forest zones.

Vegetative diversity in the Province reflects variation in climatic conditions. Average precipitation in the south is about 275 mm. This increases to about 450 mm in the north. Average temperatures decrease northward, particularly in the winter.

Many aboriginal peoples lived in both the grasslands and forested areas.

Immigration to Saskatchewan, aided by the completion of the Canadian Pacific Railway, increased greatly, beginning in the late 1800s and early 1900s. In 1901, Saskatchewan's population was about 91,000 residents. By 1931, the population rose to 920,000. Now about one million people live in Saskatchewan.

Saskatchewan's population is characterized by cultural diversity. Saskatchewan has a large aboriginal community of Indians and Metis. The largest non-aboriginal ethnic groups include British, German, Ukrainian, Scandinavian, French, Dutch and Russian. Several non-European groups are also represented in smaller numbers.

Saskatchewan's economy depends on developing our natural resources. Our rich soils, favorable climate and topography have led to the development of a large agricultural industry. An estimated 50 per cent of all jobs in Saskatchewan stem directly or indirectly from agricultural activities.

Energy production is the next largest industry in Saskatchewan. Saskatchewan is the second largest producer of oil in Canada. The Province also has significant volumes of natural gas, coal, uranium and hydroelectricity.

Several important mineral resources are being developed in Saskatchewan. These include potash, sodium sulphate, salt, copper, zinc and gold.

Other important economic sectors include forestry, tourism, construction and manufacturing.

Introduction

"Our land, compared with what it was, is like the skeleton of a body wasted by disease. The soft parts have vanished, and all that remains is the bare carcass." This lament, which could have been quoted from a contemporary ecologist, was actually sounded in the fourth century B.C. by the Greek philosopher Plato, who was mourning the deforestation and erosion of his native Attica. Similarly, the famed Cedars of Lebanon used by ancient shipbuilders and palace architects were already severely depleted during biblical times. Environmentally-related problems have contributed to the demise of entire civilizations. The decline of Mesopotamia four millennia ago has been associated with the salinization of soils, attributed to unsound irrigation techniques. These examples illustrate the historical nature of our environmental dilemma and remind us that modern humanity has no monopoly on the problem.

While environmental irresponsibility is a prevalent undercurrent in the history of civilization, the current global ecological crisis with its unprecedented scale traces its roots to the beginning of the Industrial Revolution in the mid-18th century.

This revolution brought explosive population increases, large scale rural-to-urban population transfers, increased technological sophistication, and, of course, industrialization with its accompanying consumption of resources and release of wastes on a scale never previously imagined.

Environmental disasters such as the Love Canal chemical dump, and pesticide contamination have helped start an environmental movement. More recently, problems such as ozone depletion and the greenhouse effect have increased public concern about the environment. Governments in Canada and other countries are responding to this concern by formulating strategies to ensure the maintenance and, in some cases, re-establishment of a healthy and viable natural environment. Many governments now accept that economic development can continue in the long term only in a healthy environment. The interdependence between the environment and the economy underlies the concept of sustainable development.

The concept of sustainable development was strongly advanced in the World Conservation Strategy (WCS), published in 1980 as a cooperative effort by the United Nations Environment Program, the International Union for the Conservation of Nature and Natural Resources, and the World Wildlife Fund.

The following three objectives form the essence of the WCS in a framework of priorities which should be incorporated into national, regional, and provincial conservation strategies:

- maintain essential ecological processes and life-support systems;
- preserve genetic diversity; and
- ensure the sustainable use of species and ecosystems

The United Nation's General Assembly again reviewed the state of the world's environment a few years after the release of the WCS. It concluded that although progress had been made, the environment was still deteriorating and the destruction of tropical forests and losses of animal and plant species were actually increasing.

In response, the 38th Session of the UN General Assembly adopted Resolution 38/161 to establish The World Commission on Environment and Development. For three years, the Commission held intense public hearings and received more than 500 written submissions. In 1987, the Commission released Our Common Future, commonly referred to as the Brundtland Report after the Chairperson, Madame Gros Harlem Brundtland, then Prime Minister of Norway.

The Report focused on the interrelated elements of population and human resources, food security, species and ecosystems, energy, industry, and the urban challenge, all of which determine the future viability of the environment to sustain human life. These "common" perspectives were selected by the Commission because of their universal relevance and applicability. The Commission defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." More than any previous effort, the Brundtland Report succeeded in raising environmental awareness among those in government, business, and the public.

The Brundtland Commission's visit to Canada in May 1986 led the Canadian Council of Resource and Environmental Ministers to establish a National Task Force on Environment and Economy later that same year. In September 1987 the Task Force issued a report with 40 recommendations. Among them was a recommendation to establish national, provincial, and territorial multi-sectoral Round Tables on the Environment and Economy. A Round Table serves as a forum to discuss environmental and economic issues, and to form a consensus on the development of conservation strategies for each jurisdiction.

The formation of the Saskatchewan Round Table on Environment and Economy was announced in March 1989. Membership of the Round Table currently consists of 16 senior decision makers from industry, government, aboriginal organizations, academia, interest groups, and the public. The Round Table's mandate is to develop a Conservation Strategy by the end of 1991. The strategy will promote the use and protection of Saskatchewan's resources in a manner that is environmentally, economically and socially sound.

The Round Table established seven objectives as the first step in developing Saskatchewan's Conservation Strategy.

The Objectives are:

1. **Protect Primary Resources of Air, Water and Soil**
2. **Preserve Biological Diversity**
3. **Promote Sustainable Use of Ecosystems**
4. **Efficiently Manage Non-renewable Resources**
5. **Minimize Waste**
6. **Maximize Energy Efficiency**
7. **Protect and Promote Social and Cultural Values and Heritage Resources**

The Round Table then established 11 advisory groups in May 1990 to assess sustainability within Saskatchewan's major sectors. They covered agriculture, forestry, manufacturing, tourism, mining, public administration, households, construction and development, transportation, energy, and flora and fauna. Total membership of the groups was more than 160. The groups analyzed and evaluated the sustainability of their respective sectors in terms of the seven conservation objectives adopted by the Saskatchewan Round Table. Two additional advisory groups were established in 1991.

One will recommend an education plan for sustainable development, and the other will encourage youth participation in the review and implementation of the Conservation Strategy.

The 11 sectoral reports were completed and submitted to the Round Table in March 1991. While the Round Table drew on many sources in formulating the draft Conservation Strategy around the seven conservation objectives, the sector reports provided the major building blocks for this document, which is now being submitted for widespread public consultation throughout the Province.

The purpose of the Conservation Strategy is to focus efforts by government, industry, interest groups, and individuals to achieve sustainable development in Saskatchewan. The Conservation Strategy is intended to provide a framework to help Saskatchewan residents meet their needs without sacrificing the ability of future generations to meet theirs.

Round Table members recognize that substantial efforts have been made to develop our economy without sacrificing the environment. Many of the recommendations contained in this report are presented to encourage new action. However, we also recognize and endorse activities already underway that will guide us along the road to sustainable development.

Principles of Sustainable Development

Sustainable development is a new concept for many people. It means ensuring that our present use of resources does not jeopardize prospects for their use by future generations.

The Round Table has identified eight principles as the foundation for developing a sustainable future in Saskatchewan. These principles are intended as guideposts and yardsticks to test the appropriateness of the choices we have to make about integrating the environment and the economy. Each time we make decisions we should ask ourselves if they are consistent with these principles.

1. Environmental / Economic Reality

Our world is limited by its physical, chemical and biological characteristics. We must realize that we cannot afford to continue expanding economic activities which degrade or destroy the environment. Instead, our focus must shift to economic activities which can be conducted in ways that protect and enhance the environment. Improvements in quality must become the priority for economic development.

2. Environmental / Economic Integration

All our economic activities affect the environment in which we live. We must recognize that what we do to other parts of the environment, we may also be doing to ourselves. This interdependence dictates that we must recognize the limits imposed on us by nature when releasing wastes and disrupting our environment. It tells us that we can no longer treat the environment as a free economic commodity.

3. Adaptability

Diversity is crucial to survival. It ensures flexibility and resilience, and helps maintain a healthy environment. We must not reduce biological diversity.

4. Renewability

Many of our needs for materials and energy can be obtained from renewable resources as long as we do not abuse them. We can support ourselves with renewable resources, provided we are willing to live off the "interest" and not the "capital." We should avoid using non-renewable resources or minimize their depletion by reusing or recycling them.

5. Efficiency

If we want to limit our effect on the environment, we must avoid wastefulness. We must carry out all our economic activities as efficiently as possible. We should give priority to preventing environmental degradation, because prevention is more efficient than restoration.

6. Stewardship

Our world and the resources and opportunities it encompasses are not solely the possession of our generation. We must consider the needs of future generations and leave to them an undamaged or restored environment.

7. Sufficiency

In economic activities, we must give priority to allocating resources to meet real needs.

8. Accountability

We are all responsible for contributing to humanity's effects on the environment. We must encourage meaningful individual and community participation through informed decision making. This means new initiatives in education, communication, and social institutions to foster environmental awareness and individual and community action.

CONSERVATION OBJECTIVES

Primary Resources

Objective I

Protect Primary Resources – Air, Water and Soil

Air

For millions of years, natural forces kept the air clean. Today population growth and industrial development have greatly increased the discharge of contaminants into the air. Agricultural operations, energy generation, transportation, manufacturing, and other activities release pollution at rates greater than nature's ability to deal with them. Some man-made compounds, such as chlorofluorocarbons (CFCs), actually damage the atmosphere.

In Saskatchewan, many effects of air pollution are not yet major problems. Our sparse population, small cities and air quality standards have helped prevent a decline in air quality. However, good air should not be taken for granted in the Province. Many internal and external threats to our air exist — ozone depletion, global warming, acid rain, and smog.

Ozone is a natural, vital component of the upper atmosphere, shielding the earth from the sun's ultraviolet rays. In recent years, scientists have discovered that the ozone layer is thinning. Holes have been detected above the Antarctic, allowing increased amounts of ultraviolet radiation to reach the earth's surface. Increased exposure poses a threat to human health and crops. Man-made compounds like CFCs and halons seem to be the major culprits. Used mostly in refrigerators, air conditioners (as freon), and fire extinguishers, these gases travel slowly upward and break down the ozone.

The Saskatchewan Government is participating in a national program to phase out CFCs by the year 1997 and to end the use of other ozone-depleting substances by the year 2000.

Like the glass panels of a greenhouse, the earth's atmosphere works like a giant heat trap, warming our environment and sustaining life. The gases in our atmosphere — carbon dioxide, CFCs, methane and nitrous oxide — trap solar radiation and prevent heat loss. In the last 100 years, concentrations of these gases have increased. Except for CFCs, these increased levels can be traced to the production and use of fossil fuels. Most scientists say the rising concentrations of these "greenhouse" gases are causing significant increases in global warming. In Saskatchewan, recurring regional droughts and high temperatures in the 1980s could be the effects of increased levels of greenhouse gases.

Carbon dioxide (CO_2) is the major greenhouse gas. Saskatchewan has the second highest per capita emissions of CO_2 in Canada. Our climate, distance between communities and use of fossil fuels have contributed to the high emission level.

The federal government has developed a strategy to limit greenhouse gas emissions by the year 2000. This strategy will have significant implications for our Province's economy and industrial development. However, Saskatchewan residents can play an important role in reducing greenhouse gases by decreasing consumption of fossil fuels. Improved energy conservation helps address the issue without major lifestyle changes. Energy conservation is discussed in the Energy Section of this document.

Acid rain forms when sulphur dioxide and nitrogen oxides mix with water vapor in clouds and settle to earth as rain, snow, or mist.

In eastern Canada, acid rain has damaged about 150,000 lakes, 15 million hectares of forest and contributed to an increase in human respiratory problems. Estimates place the annual cost of acid rain to the Canadian economy at a minimum of $1 billion per year.

Although acid rain is not currently a serious problem in western Canada, it contributes to the national problem. The federal government has committed all provinces to a national cap on major pollutants that form acid rain.

Air monitoring in Saskatchewan has been conducted since 1970 to determine the nature and extent of air pollution in major cities. Since 1970, ground-level ozone (smog) has increased each year. However, compared to other provinces, Saskatchewan's smog level is low.

Exposure to high readings of ground-level ozone can cause eye irritation, breathing difficulty, decreased visibility and vegetation damage. Because smog comes from more than one source, it is difficult to control. To reduce it, we may need tougher emission standards and reduced use of gasoline-powered vehicles.

Recommendations

I. Develop a clean air strategy to protect and improve Saskatchewan's air quality

Action:

1. Develop a public forum on air quality issues as they affect Saskatchewan.
2. Continue to investigate the impacts of national and international air quality issues and management plans on Saskatchewan.
3. Maintain government support for an inter-agency advisory committee that is coordinating actions in western provinces and territories to ensure a consistent transboundary approach to air quality management.
4. Continue and improve education programs to inform people about how they contribute to air pollution, and how individual decisions can help protect our air.

II. Implement local policies and programs to enhance air quality

Action:

1. Phase out the use of CFCs and other ozone-depleting substances. Immediately begin collecting and recycling ozone-depleting substances.
2. Develop an air quality monitoring program for rural areas and expand the urban air monitoring program to include all major cities in Saskatchewan.
3. Re-establish acid rain monitoring in northern Saskatchewan.
4. Governments should encourage the use of energy efficient transportation and alternative fuels. They should also investigate the need to ensure air pollution controls are maintained on all vehicles.
5. The provincial government should encourage the use of "best available control technologies" in Saskatchewan industries.

III. Ensure that all government policies, programs and projects do not degrade air quality

Action:

1. Evaluate government policies, programs, and projects to ensure they do not degrade air quality.
2. Require all government agencies to take air quality into account in planning and undertaking their day-to-day responsibilities.

Water

Saskatchewan's surface water covers 12 per cent of the land area. Most surface water is in the northern half of the Province while little is available in the semi-arid southern half where the greatest demand for water for agricultural and industrial use exists. Because surface water varies in its occurrence and distribution, ground water is important to Saskatchewan people. In fact, the Province uses about 50,000 water wells.

About 60 per cent of people in rural areas rely on ground water for domestic needs. Ground water is highly mineralized and stable while surface water has lower mineral concentrations and seasonal variations in clarity, color, taste and odor. Local water from both sources must be treated to produce palatable and safe water. Increasingly, limited water sources, stricter standards and high costs have made it difficult to develop new water supplies and to expand existing systems to meet future community needs.

Long-term water policies and programs are needed to reduce water demands and lessen the effect of waste water on receiving waters, to enhance and protect the quality of water and to promote wise use of this resource.

Water for domestic purposes must be given the highest priority.

Many farmers in southern Saskatchewan irrigate to alleviate dry conditions during the growing season. Irrigation projects range from "backflood" types, designed and operated by individual farmers, to large-scale, multi-use projects such as the Outlook and Luck Lake projects.

Another form of irrigation uses municipal treated effluent. Effluent irrigation has the additional benefit of reducing water pollution.

Extended use of irrigation can cause increased soil salinity and leaching of minerals into ground and surface water. Keeping soils under irrigation viable requires careful planning and management.

Agriculture has changed the landscape of southern Saskatchewan. It has reduced wetlands through draining and land clearing. Wetlands are needed to recharge ground water and maintain surface water quality. A comprehensive policy to preserve wetlands does not yet exist in Saskatchewan.

Agriculture, industry and households are all sources of water contamination. Fertilizers, pesticides, manure, chemical spills, injection wells, leaking underground storage tanks and municipal landfills can all contaminate water. The use of surface and ground water must be sustainable. The following recommendations are crucial to maintaining Saskatchewan's water resource.

Recommendations

I. Develop a sustainable water management strategy

Action:

1. Develop a water management plan that would include all factors that affect surface and ground water quality and quantity.
2. Direct the Saskatchewan Water Corporation (quantity) in cooperation with Saskatchewan Environment and Public Safety (quality) to be responsible for developing a water management strategy for Saskatchewan.
3. Make domestic water use the priority in allocating ground water and surface water in Saskatchewan.
4. Maintain an inventory of current water levels and water quality information in the Province to provide data for planning and management. Particular emphasis should be given to gathering information on ground water and northern waters.
5. Promote the integration of waste water disposal and water reuse to minimize pollution sources and to conserve fresh water.
6. Develop specific water quality objectives to protect our largest bodies of water where intensive use occurs or is planned.

II. Ensure that irrigation projects are sustainable

Action:

1. Assess all proposed large-scale irrigation projects to ensure that they are environmentally, socially and economically sustainable.
2. Give preference to irrigation projects which link together many initiatives, such as wetland conservation, urban water supply, water for processing plants and water for diversified crop production.
3. Ensure that irrigation systems are metered and water is priced to adequately reflect the costs of production to promote water conservation.
4. Promote, as appropriate, the use of treated municipal, industrial and agricultural waste water effluent as an alternate source for irrigation water.
5. Audit irrigation projects, based on inputs versus outputs to ascertain whether projects are sustainable.

III. Ensure that the price of water reflects the costs of production, delivery and maintenance

Action:

1. Eliminate water subsidies.
2. Establish standards for water consumption by water using equipment to promote water conservation.
3. Encourage communities to audit their water use to evaluate conservation efforts.
4. Develop public education programs to promote an understanding of the value of water and how to conserve and protect it.

IV. Protect and improve our surface and ground water resources

Action:

1. Prevent surface and ground water pollution from landfill sites, underground storage tanks, sewage systems, liquid containment lagoons, injection wells and other sources through site sensitivity studies, good engineering design and ongoing monitoring.

2. Promote greater public awareness of the need to maintain water quality and to preserve aquatic resources through education and demonstration projects.
3. Maintain wetlands to protect water quality and quantity.

V. Conduct research to improve and protect our water resource

Action:

1. Conduct research into:
   - water conservation
   - maintenance of water quality
   - the impact of domestic and industrial pollution
   - water supply and distribution mechanisms
   - the use of geographic information systems

2. Evaluate the possible effects of global warming and severe drought in terms of the effects on water supplies.

Soil

Soil is a vital part of our environment. It is needed to grow food and to raise livestock, to produce forest products and to provide organisms to break down organic matter. Through agriculture and forestry, soil provides the basic necessities for our existence. There are competing land uses, however, which remove soil from production or diminish its quality.

The deterioration of soil quality began when soils were first cultivated. Cultivation disturbed the soil's nutrient balance, resulting in a loss of about half of its original organic matter in Saskatchewan. Continued cultivation, using inappropriate practices under dry land conditions caused wind and water erosion and salinization of soils in some areas. About six million hectares of agricultural land are currently at risk from wind and water erosion, while another 801,000 hectares are affected by salinity.

In the forestry industry, soil degradation occurs when areas are cleared of all vegetation. Under these conditions, soil nutrients are removed and exposed soils are at risk of eroding and affecting waterways.

Soil degradation continues despite increased information about soil conservation techniques. Economic pressures often force producers to break and seed more land, cultivate more frequently and take management short-cuts which can damage the soil.

When farm expansion occurs in Saskatchewan it is primarily onto marginal lands that are not ideally suited to intensive agricultural production. Use of marginal land contributes to soil degradation through the spread of salinity and soil erosion. Clearing marginal lands may also destroy wetlands or forested areas, affecting waterfowl and wildlife.

Other developments can also degrade the soil or remove it from productive use. Mining, oil and gas production, rural and urban expansion, and road construction remove land from production and may pollute it through accidental spills. The Province was settled in areas where agricultural soil was of a high quality. Today industrial and urban expansion occurs on these soils, further reducing the amount of good soil available for agriculture.

To address the problems of soil degradation and loss, three basic areas need to be considered: the provision of effective incentive policies and programs, education programs and increased research.

Recommendations

I. Ensure that sustainable soil management techniques are adopted

Action:

1. Evaluate new and existing policies and programs, including economic incentives, in terms of their impact on soil conservation practices.
2. Provide incentives to encourage the adoption of soil conservation practices and the development of conservation planning. This process should begin immediately. Programs that unintentionally encourage unsustainable soil practices should be phased out by the year 2000.
3. Restrict breaking, clearing and draining activities that will not maintain soils at an acceptable level of quality.
4. Establish environmental codes of conduct for forestry, agriculture and other industries that have the potential to affect soil quality or availability.
5. Evaluate the potential use of cross compliance in Saskatchewan and its potential impact on the adoption of soil conservation practices. (Cross compliance involves the establishment of farm management plans in exchange for the ability to participate in government programs).

II. Enhance the delivery of soil conservation information

Action:

1. Educate the general public on the value of soil conservation practices and their long-term economic benefits.
2. Improve delivery mechanisms for technology transfer to enable agricultural producers and foresters to implement conservation techniques.

III. Continue to support and promote inter-disciplinary research and development initiatives aimed at soil conservation

Action:

1. Assess rates of soil nutrient depletion and degradation from agricultural and forest soils.
2. Assess the effects of agricultural and other chemical use on soil quality.
3. Conduct research to determine the most effective methods for ensuring the adoption of soil conservation practices.
4. Conduct research to determine the most appropriate methods for rehabilitating degraded agricultural lands.

Biological Diversity

Objective II

Maintain Biological Diversity

Biological diversity is the wealth of life forms found on the earth including plants, animals, micro-organisms, the genes they possess, and their habitats.

Biological diversity includes three levels of diversity:

- **Ecosystem diversity** includes species and natural processes.
- **Species diversity** refers to the diversity among species.
- **Genetic diversity** refers to diversity within species.

Human skin and hair colors express an individual's genetic make-up. The fewer individuals there are in a species, the less genetic variability there is. Less diversity reduces a species' ability to react and adapt to environmental changes. The loss of species makes ecosystems more vulnerable to collapse.

Saskatchewan has two main landscapes, forests and grasslands. They are divided into six ecological regions: Cypress Hills, Grasslands, Parkland, Southern Boreal, Northern Boreal, and Sub-Arctic Boreal.

Saskatchewan has about 1,300 species of vascular plants, with 1,250 species of flowering plants, 40 species of ferns and fern allies, and nine species of conifers. There are 78 species of mammals, seven species of amphibians, 12 species of reptiles, 68 species of fish, and 242 species of breeding birds. Numerous invertebrates and micro-organisms are also present in Saskatchewan.

Natural processes can cause the extinction of some species and create new ones. However, human activities have accelerated species loss, creating an unprecedented threat of mass extinction.

Saskatchewan's prairie region is one of the most altered landscapes on earth. In the past century, more than 80 per cent of the Aspen Parkland has been altered or eliminated. Only about 24 per cent of the original Mixed Prairie ecological region remains, mostly because of agricultural development.

Threatened, Endangered, Extirpated And Extinct Species in Saskatchewan

Threatened
Caspian Tern
Burrowing Owl
Sage Grouse
Ferruginous Hawk
Peregrine Falcon
Piping Plover
Bison
Western Rattlesnake
Eastern Yellow-bellied Racer

Extinct
Passenger Pigeon

Endangered
Eskimo Curlew
Whooping Crane
Trumpeter Swan
Greater Prairie Chicken

Extirpated
Grizzly Bear
Swift Fox
Black-footed Ferret

The preceding table lists threatened, endangered, extirpated (no longer living in the wild in the Province), and extinct Saskatchewan species of birds and mammals. This list is based upon the best information available to the Provincial Wildlife Branch.

Loss of natural habitat is the most significant threat to species and ecosystems. In Saskatchewan this has been mainly the result of agricultural activities.

Pollution may soon be the biggest threat to many species, especially pollution that threatens the stability of our climate and biochemical cycles. The effects of industrial wastes and agricultural chemicals on ecosystems are complex and not well understood.

Many non-native species have been introduced to Saskatchewan, both accidentally and intentionally. Although many are important for agriculture, reclamation, and recreation, others such as Norway rats are undesirable economically and environmentally.

Uncontrolled hunting has destroyed some native Saskatchewan species, such as the Plains Bison, Grizzly Bear, and Swift Fox. However, improved wildlife management and enforcement have helped protect other species.

Human survival and prosperity depend on biological diversity. Humanity has only begun to tap the earth's biological diversity. About 75 per cent of our nutrition comes from just seven plant species: wheat, rice, maize, potato, barley, sweet potato, and cassava. The first three alone provide 50 per cent of our food. Many more of the earth's millions of plant species could become important for food and economic prosperity.

Wild ancestors of domestic grains must be protected in case of disease, climate changes, or other variables. The potato famine in Ireland in the 1840s and the corn blight in North America in the 1970s demonstrate how vulnerable we are to natural disasters when we rely on just a few plant species for food. The potato famine brought death to thousands. The corn blight was an economic disaster.

Ancestor plants are also important to science. Improved plant breeding is equally or more important for high crop yields than irrigation and the use of fertilizers and pesticides.

Our biodiversity provides us with other dividends. Recreation, such as bird watching, contributes to the provincial economy. Although its exact value is difficult to assess, recreation is a multi-million dollar industry.

All of earth's biological diversity has the potential to benefit humans. We use bee venom to treat arthritis. We study black bears to find a cure for kidney disease. An Alberta researcher indicates that a particular moss may be useful in treating Alzheimer's disease. We, therefore, need to preserve all of the earth's genetic resources, not just the ones that have current value.

Humanity depends on other forms of life for survival. The economic potential of biological resources can be realized only if biological diversity is maintained. The following recommendations outline the actions that are necessary to protect Saskatchewan's biological diversity.

Recommendations

I. Manage Saskatchewan's landscape to protect or enhance biological diversity

Action:

1. Ensure government agencies take into account biological diversity in their planning and day-to-day activities.
2. Develop a comprehensive policy and form partnerships to encourage preservation of biological diversity on private lands.
3. Ensure that preservation of biological diversity is a reclamation objective.
4. Establish a provincial list of all known vulnerable, threatened, endangered, and extirpated species, and annually update the list.
5. Implement recovery plans for all threatened and endangered species and, where and when feasible, extirpated species.
6. Ensure that vulnerable, threatened and endangered species are considered in determining protected areas.

II. Complete and maintain a comprehensive system of protected areas to maintain the biological diversity of Saskatchewan

Action:

1. Establish a protected areas system for Saskatchewan by the year 2000 that would include at least one representative protected area in each of the 31 natural zones.
2. Identify an agency to be responsible for coordinating the development of a protected area system and reporting annually on biological diversity in Saskatchewan.
3. Create a committee of government and non-government organizations to advise on the development of the Province's protected area system.
4. Establish a biological data management system.

III. Ensure that Saskatchewan has adequate legislation and enforcement programs to protect biological diversity

Action:

1. Prepare an Endangered Species and Habitat Act.
2. Reform legislation that conflicts with the objective of maintaining biological diversity.
3. Establish a provincial-federal biological diversity committee to review current legislation in order to determine deficiencies or contradictory laws and regulations that affect biological diversity.

IV. Promote and support research to maintain biological diversity

Action:

1. Governments should increase and coordinate research to determine techniques for sustainable management of ecosystems.
2. Undertake research to determine the impacts of acid rain, climate change, and pesticide use.
3. Support research that enhances the use of Saskatchewan's biological diversity for medical, industrial and other uses.

V. Ensure effective partnerships for the conservation of biological diversity

Action:

1. Establish a provincial biological diversity research committee to determine research needs, increase information exchange and coordinate efforts, including fund raising.

2. Through legislation and formal agreements, form partnerships with countries, states, provinces and territories to protect Saskatchewan's biological diversity.
3. Establish regional committees to develop management plans for protected areas.
4. Develop a federal-provincial-Indian partnership to ensure protection of biological diversity on Indian reserves.
5. Saskatchewan should contribute species and financial resources to global gene banks and assist with efforts to maintain wild ancestors of the Province's domestic crops and livestock in their natural habitats.

Ecosystems

Objective III

Ensure the Sustainable Use of Ecosystems and Species

Long-term economic prosperity in Saskatchewan requires the sustainable use of ecosystems and species. Our economy depends on the sustainable use of agricultural systems, forests, and flora and fauna resources. Tourism also relies on healthy forests and lakes, parks, and abundant wildlife.

Agriculture is a $4 billion industry in Saskatchewan, producing 50 per cent of all jobs directly or indirectly. About 20 million hectares of land in Saskatchewan are cultivated and another 6.5 million hectares support livestock production and forage crops. The success of sustainable development in the Province depends heavily on changes made in agriculture.

The agricultural sector now uses large volumes of non-renewable fuels and other resources. Cultivation depletes the soil and the Province's biological diversity. In short, current agricultural practices are not sustainable.

Perhaps the greatest barriers to sustainability are policies and subsidies which encourage over-use of resources and the use of land that is not suitable for agriculture. Policies and programs must be evaluated for long-term environmental effects. Economic subsidies should not be linked to total acreage farmed or bushels harvested. Subsidies should promote only sustainable practices.

Farmers in Saskatchewan are contending with decreasing soil quality and erosion.

A major cause of soil degradation is the loss of organic matter. When soils are cleared and cultivated they lose organic matter and they need fertilizers to maintain productivity.

Soil loss is perhaps the most serious problem. Wind and water erosion cost Saskatchewan farmers about $300 million annually. Cultivation of highly erodible soils and poor soil conservation practices compound the problem. Controlling erosion must be a high priority with the government and producers.

At least 800,000 hectares currently being used for annual crop production are extremely susceptible to erosion and incapable of sustained production. They should be used only for forage and pasture.

Rangelands must be managed to protect their long-term productivity for grazing. Over-grazing can destroy pastures in a relatively short period of time. Using non-native forage plants can enhance livestock production but not without altering native prairie, reducing Saskatchewan's biological diversity.

Sustainable agriculture requires sound management of water. We need water quality monitoring and conservation farming practices to protect water from chemical contamination and sedimentation.

Pesticides are currently widely used in Saskatchewan's agricultural industry. Nearly all cereal, oilseeds, pulse and forage crops receive one or more annual applications.

Agriculture Canada is the federal agency that is responsible for pesticide research, development, manufacturing and imports. The agency determines the appropriate use of pesticides and prescribes labels for each product. Labels provide users with information to safely and appropriately use specific pesticides. Saskatchewan Agriculture and Food licenses commercial pesticide operations. Non-commercial users, such as farmers, do not need licences or training. Saskatchewan Environment and Public Safety regulates commercial storage and disposal of pesticides and containers, but it does not control the use of pesticides. The department regularly monitors surface water for pesticide contamination, but not ground water.

The effects of pesticides must be carefully researched and products properly used, disposed of, and stored. Pesticides should be used only by qualified operators. Specific pesticides should be banned in areas occupied by threatened or endangered species, even if only during breeding or nesting periods.

Sustainable agriculture requires an integrated land management approach because agricultural activities affect other land uses, and vice versa. Integrated management is essential from policy formation to program implementation.

Agriculture will remain a vital component of Saskatchewan's economy, perhaps even increasing in importance. To protect Saskatchewan's agricultural systems, we need to improve soil management practices, develop more integrated pest management strategies and incorporate other management changes.

Changes in agriculture may include more complex management, as in agro-forestry. The intent of agro-forestry is to combine agriculture and forestry. For example, a farm shelterbelt, established to prevent soil erosion and maintain soil moisture, could also be gradually harvested for wood products.

Berry producing shrubs could be planted in shelterbelts and harvested, providing additional income to farm families.

Organic farming has been practiced in Saskatchewan for many years. Currently, there are about 300 farms certified as organic in Saskatchewan. These farmers' experience will prove valuable in the future because they have learned to reduce inputs for both environmental and economic reasons.

Recommendations

I. Governments and agriculture producers must develop a comprehensive strategy to protect and rehabilitate soil resources

Action:

1. Governments should immediately evaluate their policies to ensure that they encourage sustainable soil management. Policies that encourage non-sustainable soil management should be eliminated.
2. As part of the qualification process for subsidies governments should help agricultural producers to incorporate environmentally sustainable practices into their current operations.
3. Marginal lands currently under cultivation should be returned to permanent cover.

II. Governments, in cooperation with pesticide manufacturers and users, must develop a comprehensive pesticide management system

Action:

1. Pesticide applicator training programs should be strengthened for non-commercial users.
2. A comprehensive pesticide monitoring program should be developed for both ground and surface water, and a pesticide information system must be developed to give health and environmental agencies access to types and amounts of pesticide products being used in specific areas.
3. A program should be developed to protect threatened and endangered species from harmful pesticides.

III. Governments and agricultural producers should develop improved integrated pest management programs

IV. Governments and agricultural producers must develop programs and policies to ensure sustainable use of grazing resources

Action:

1. Management plans should be developed for all Crown grazing lands to ensure sustainable use of grazing resources and to achieve multiple land use.
2. All remaining native rangeland should be managed to maintain Saskatchewan's biological diversity. Damaged areas should be restored to productive rangelands.

V. Governments and agricultural producers must cooperatively develop multiple land use objectives for Crown agricultural lands and Crown resources on private land

Action:

1. Governments should develop comprehensive land use plans for agricultural Crown lands, especially those areas which are currently used for multiple purposes.

2. Government agencies and agricultural producers should work together to minimize wildlife damage problems.

VI. Increased research is required to protect and enhance Saskatchewan's agricultural systems

Action:

1. Research is required to:
   - improve integrated pest management
   - identify crops, cropping systems, and agronomic practices that improve and enhance protection of soil resources while increasing net farm income.
   - develop sustainable grazing management practices.
   - determine the potential for developing renewable energy sources from agricultural products.

Forests

Designated forest zones cover about 46 per cent of Saskatchewan's land area. This area is subdivided into six eco-districts, each characterized by distinctive vegetation, soil, fauna and water systems. Other forested areas include private woodlots, Indian reservations, provincial parks, Wildlife Development Fund and critical wildlife habitat lands. Some of these presently supply timber. Others could in the future.

Saskatchewan forests contain 13 species of commercial trees. Saskatchewan's forest products were worth about $259 million in 1988 and one in every 55 jobs is related to forestry. Forests are also home to many of the Province's aboriginal residents. Northern residents and aboriginal people rely on hunting, fishing and trapping in these areas. Recreational activities, such as big game hunting and commercial fishing, generate millions of dollars annually.

Forest ecosystems offer benefits to bird watchers, berry pickers and photographers. More importantly, they maintain our primary resources of air, water and soil. Forest cover prevents soil erosion, regulates seasonal water flow and helps the soil absorb moisture. Forests also serve as a valuable carbon sink by absorbing carbon dioxide and producing oxygen. Carbon dioxide is one of the principal gases linked to global warming.

Most Saskatchewan forests are Crown lands that have been divided into the Commercial Forest Zone and the Northern Reconnaissance Zone. Most timber harvesting has occurred in the commercial zone. This zone represents about 12 per cent of Saskatchewan's forested lands.

The primary legislation governing forest activities is The Forest Act, which allows the provincial government to regulate timber harvesting on all Crown lands. Rights to harvest forest products are obtained three ways: Forest Management Licence Agreements (FMLAs), Timber and Forest Product Field Permits, and Term Cutting Agreements.

About two-thirds of the commercial forest zone is under FMLAs. FMLA operators have to submit five and 20 year forest management plans in exchange for secure tenure. Most of the remaining one-third is allocated by field permits for timber and forest products. Timber permits are required for commercial forest purposes, while field permits are issued to domestic wood users. Timber cutting agreements are available to small operators. Their harvesting plans must also be approved by the provincial government.

Forest products are renewable if forests are properly managed. Perhaps the greatest barriers to developing a sustainable management plan are a limited understanding of complex forest ecosystems and the absence of an up-to-date, comprehensive inventory of forest resources. Integrated resource management will also be necessary. FMLA agreements should ensure commitment to protecting biological diversity and forest productivity.

Recommendations

I. An ecological management approach must be used in the development of Saskatchewan's forested lands

Action:

1. A comprehensive inventory of our forests should be completed.
2. Harvesting practices for each specific area must be determined, based upon forest type and multiple objectives.
3. Maintaining biological diversity and forest productivity should be the goal of reforestation.
4. The future role of woodlots in Saskatchewan's forest industry should be determined.
5. Integrated resource management plans should be developed for multiple use areas.
6. Forest Management Licence Agreements should serve as the mechanism to achieve integrated planning and sustained forest production in the commercial forest zone.
7. Public participation processes should be developed to ensure adequate stakeholder involvement in managing the public forest.
8. Intensive versus extensive forest management should be evaluated to determine appropriate approaches.

II. Existing forest fire suppression should be maintained and pest detection increased

III. Increased research is required to manage forests on a sustainable basis

Action:

1. Ecologically based forest management research must be increased to determine development impacts and to identify alternative harvesting and reforestation practices.
2. Increased research is required to better understand the role of fire in ecosystem maintenance and the role fire could play in forest management.

Flora and Fauna

Consumptive uses of Saskatchewan's flora and fauna help support the Province's economy in many ways. Sales of timber products exceed $250 million each year. More than 100,000 residents hunt, spending over $50 million. Another 250,000 anglers spend an estimated $71 million annually. Fur sales contribute $4 - $10 million, providing income for 17,000 to 20,000 trappers. Hunting, fishing and gathering are also vital to aboriginal people and many northern families and communities.

Saskatchewan's native flora and fauna are extremely important economically and environmentally. Harvesting of flora and fauna, if properly managed, will provide long-term benefits to Saskatchewan residents.

Major obstacles to achieving sustainable use of flora and fauna include preventing the decline of species from habitat destruction and over-harvesting. Better information is also needed to determine sustainable harvesting rates.

Recommendations

I. Ensure that biological resources are used on a sustainable basis

Action:

1. Complete inventories to determine sustainable harvest rates for flora and fauna. Priority should be given to forest and range ecosystems, native fish species, and all species used by subsistence hunters and gatherers.
2. Harvest resources on a sustainable ecosystem basis, not on the basis of a single species' sustained yield.
3. Carefully analyze the costs and benefits before introducing exotic species.
4. Promote non-consumptive uses of wildlife to maximize economic returns from scarce resources.

II. Government, resource developers and users must develop sustainable strategies for harvesting Saskatchewan's flora and fauna

Action:

1. Training courses should be offered to improve ecological management of flora and fauna.

III. Increased research is required to determine sustainable use rates and to develop management strategies

Action:

1. Research is required to:
   - determine sustainable harvest rates for species and ecosystems
   - to identify the most cost-effective resource inventory mechanisms.

Tourism

Saskatchewan's natural resources provide recreation and attract tourists. Travel by residents accounts for 77 per cent of all trips within the Province.

Tourism generates $650 to $750 million annually, supporting 18,000 jobs directly and indirectly.

Tourism in Canada is expected to grow in the 1990s. Given this trend, Saskatchewan should maintain or enhance its tourism. Our forests, lakes and rivers, beautiful landscapes and clean air are extremely marketable. Expanding our provincial park system will require Crown ownership of large tracts of land throughout the Province. Most cottages are on Crown land, and Crown land also protects wildlife populations which attract hunters.

Privately held lands are also important in supporting fish and wildlife. Farms and ranches and aboriginal people could play a greater role in tourism.

Development must be carefully planned in Saskatchewan to protect the tourism industry. Agriculture, forestry and mining modify natural landscapes, causing the loss of natural species. Because tourism is especially prone to negative effects from other sectors, mechanisms must be developed to ensure that compatible objectives are developed for given areas and resources. We need a comprehensive approach to managing our resources.

Recommendations

I. Saskatchewan's natural resources must be protected to support tourism

Action:

1. The carrying capacity of tourism resources should be determined and measures taken to prevent over-use of these resources.
2. Strict guidelines and enforcement programs need to be developed for sensitive sites.
3. The Crown should retain ownership of lands that are needed to sustain tourism.

II. Increased planning and management are required to maximize tourism benefits

Action:

1. Partnerships should be created among interested parties, and tourism development should be integrated into regional planning and management.
2. A code of ethics and operating standards should be developed to promote sustainable tourism.
3. Aboriginal people and other cultures should be given a greater role in developing Saskatchewan's tourism potential.
4. Saskatchewan's provincial park system should be expanded to enhance tourism.
5. Government must develop and support the transportation infrastructure necessary to maintain or enhance tourism.

III. Increased education and awareness are required to ensure tourist operators and tourists understand their role in achieving a sustainable tourism industry

Action:

1. The tourism sector should develop public awareness programs to make tourists sensitive to the effects of their actions.
2. The tourism sector should develop training programs for employees to foster sustainable tourism.

Non-Renewable Resources

Objective IV

Managing Non-Renewable Resources

Mining is the extraction of mineral resources through exploration, development, production, reclamation, decommissioning (or removing from service), to abandonment. For most of Saskatchewan the resource owner is the Province, which issues Crown mineral leases, granting permission to extract the resource, subject to certain conditions.

The mining industry is fundamental to modern civilization. Products developed from minerals are important in construction, transportation, household products, power, and communication systems.

The concept of sustainable development for non-renewable resources differs from that for renewable resources. The mining of a particular ore body is non-sustainable, but the mining industry as a whole can continue over time. Applying the Round Table's "Principles of Sustainable Development" to non-renewable resources means:

- Non-renewable resource development should not threaten the environment or renewable resources on which future generations depend. Responsible mining means minimizing negative effects while enhancing positive ones.
- Mineral wealth should be passed on from one generation to another. Over time, exploration, recycling, new technology, and product substitution should replace exploited ore deposits. These practices should endeavor to leave future generations no worse off than the present generation.
- Mining development and protection of the environment should be integrated, creating sensible trade-offs that consider all costs and benefits in the decision-making process.
- We should recognize that mining affects the social structure and culture of local people. Therefore, consideration of these effects is part of decision making for sustainable development.
- We should avoid wasting resources through inefficient mining techniques by reducing, reusing, recycling and recovery where possible.
- We should restore a site as nearly as possible to conditions existing before development.

The mining industry is an important source of wealth, materials, employment, exports and government revenue. In the past three years, the annual value of mineral sales has been $1.5 billion. Potash and uranium are important export commodities, totalling almost 20 per cent of provincial exports.

About 6,300 people were employed in mining or exploration in 1989. The Saskatchewan Mining Association estimates that direct and indirect employment from mining creates 27,000 jobs or six per cent of all the jobs in the Province. The mining industry's total expenditures in 1988 were $1.5 billion. Mining expenditures are particularly important in northern Saskatchewan, where mining is the single largest private sector, full-time employer.

Mining also leaves its mark on the environment. Current potash operations use 3,400 hectares for storing waste salt. Strip mining of coal creates a short-term, major disturbance during mining. The steep walls and deep, flooded holes of unreclaimed sand and gravel pits can be dangerous. Access roads and cleared sites for northern mineral exploration leave scars on the landscape which remain visible for years.

Water near many mining operations is affected by liquid effluents. Effects on air quality are mostly local — dust from road traffic and tailings piles, and plant emissions.

Effluent standards generally ensure that discharges from mining operations are not acutely toxic. Accidental spills may, of course, be toxic at the point of discharge. In northern Saskatchewan, stream crossings constructed improperly during mining exploration may block the movement of fish.

Radioactivity is common but not unique to all uranium mines. Silver, gold, and base metal mines may also give off some radioactivity. However, radiation levels are controlled to protect worker health and safety.

Recommendations

I. Increase the longevity of mineral resources by ensuring that mineral deposits are mined and used in an environmentally and economically acceptable way

Action:

1. Government, industry and the public should pursue policies that encourage using substitute materials to conserve more valuable resources.
2. Industry and government should support research and development of technologies that increase recovery rates of mineral resources.
3. Industry, government, and the public should emphasize the recovery, reuse and recycling of minerals and metals and their products.
4. Reduce demands on non-renewable resources through public education and information programs.
5. Ensure that environmental costs are included in pricing of mineral products.

II. Strengthen reclamation and decommissioning requirements when evaluating new and expanded mining projects

Action:

1. Government should develop area-specific reclamation guidelines and certification criteria for the abandonment of reclaimed land.
2. Require mining companies to demonstrate that necessary decommissioning and reclamation plans can be carried out.
3. Government should consider accepting a shared responsibility with industry in meeting the cost of required new decommissioning and reclamation measures that are additional to ones already in place and approved.

III. Integrate mining into a region's economy

Action:

1. Improve cooperation among industry, government, and local communities through initiatives such as increased hiring and training of local residents, greater use of local business services, providing scholarships, and establishing mining sites as tourist destinations.

IV. Conduct further research and development into improved mining practices

Action:

1. Industry, government, and education and research institutions should cooperate in researching the following:

   - environmental research to support regulations
   - waste disposal technology
   - improved mining techniques
   - exploration techniques
   - acceptable and effective reclamation techniques
   - resource assessments
   - product diversification
   - socio-economic assessment, monitoring and documentation
   - the establishment of mining towns as opposed to commuting labor forces
   - technologies which increase rates of recovery of mineral resources

Energy

Objective V

Maximize Energy Efficiency

Saskatchewan's energy development and use is focused on conventional fuels and sources. We produce and use crude oil, natural gas, coal and hydroelectricity. We extract uranium but use none in this Province to meet energy needs.

We also have renewable sources of energy — sunshine, wind and biomass, for example. However, few are being harnessed to meet our energy requirements.

Most of our non-renewable fuel production is exported: 95 per cent of crude oil, 40 per cent of natural gas, 20 per cent of coal and 100 per cent of uranium. Therefore, curtailing energy consumption in the Province will have a limited effect on resource extraction for energy.

Energy consumption is high in Saskatchewan and it can be expected to grow in the foreseeable future. Most of this increased demand will occur in the industrial and commercial sectors. In the short term, we will probably have to meet our expanding needs from non-renewable sources. However, a serious commitment to conservation would control our expanding needs and limit our future depletion rates of non-renewable resources.

It is difficult to determine the quantity of reserves of non-renewable energy resources. New reserves are found as others are depleted. However, we know that they will not last forever.

At present, we are aware that at 1988 consumption rates, Saskatchewan has about 127 years of coal left, 18 years of natural gas and 10 years of crude oil.

We have not yet evaluated uranium or solar, wind, or other renewable energy sources for Saskatchewan.

The major questions confronting the people of Saskatchewan are:

- how can we best manage our energy demands?
- what energy resources should we develop to meet our needs?
- in what order should we develop these sources?
- how do we best minimize the impact of energy development on the environment?

Our paramount consideration in answering the previous questions has to be the development of a sustainable energy path for Saskatchewan. There will be a continuing need for the use of non-renewable resources. However, we must use our time wisely in finding replacement sources to prevent disruption when our conventional sources near their end.

Several tools are available to address these questions. One is least-cost planning. Least-cost planning calls for conservation and using the lowest-cost energy resources before exploiting other energy supplies. It recognizes that energy conservation is often the most cost effective way to meet demands. A least-cost plan identifies alternative energy demand forecasts and compares them to several resources — efficiency measures, renewable sources, energy purchases, and traditional utility generation. Energy savings count as a resource.

We may also harness alternative energy sources. Compressed natural gas, ethanol and methanol offer environmental and economic advantages as transition fuels or fuel blends for motor vehicles.

Alternative fuels require additional industry and government support through research, development, and fiscal incentives to compete with fossil fuels. Clean burning alternative fuels can replace gasoline and diesel fuel, producing fewer emissions, lower operating costs, and less carbon dioxide.

Hydroelectricity, wind, and solar power generate environmentally sustainable energy. Many sustainable energy alternatives are technically feasible but not yet economical. However, conventional pricing does not reflect the full cost of traditional energy sources. Current prices do not take into account environmental costs or direct or indirect subsidies. Still, progress is being made. For example, solar cells are expected to be cost competitive with conventional utility generation by the late 1990s in the United States.

Energy prices largely determine the quantities and types of energy that are produced and consumed. Prices, taxes, and subsidies provide the financial incentives or deterrents that influence decisions about energy supply and demand. The provincial government can influence energy prices through utility rates, oil and natural gas royalties, and a variety of fees, taxes, and subsidies. These economic tools can make markets more environmentally aware and energy efficient.

Fully valuing natural assets helps to ensure proper use and allocation. The pricing and taxation of energy services needs to be analyzed from a long term and uniform provincial perspective, incorporating least-cost planning criteria, and taking environmental and non-monetary values such as aesthetics and recreation into account.

Recommendations

I. Industry, government and the public must develop a sustainable energy strategy for Saskatchewan

Action:

1. Develop Saskatchewan's sustainable energy sources.
2. Immediately conduct a study of the total and achievable conservation and energy efficiency potential.
3. Encourage the use of co-generation in industrial, commercial and individual private operations.
4. Make the provincial power grid available for direct transmission of energy from co-generation facility to consumer on a full-cost recovery basis.
5. Revise building codes and urban design practices to reduce energy consumption.
6. Promote redevelopment and retrofitting of buildings to meet specified energy performance standards.
7. Public and private sectors should work toward establishing national standards for high efficiency lighting, electrical motors, appliances, and equipment.

II. Design and implement policies and programs to reduce energy consumption in the transportation sector

Action:

1. Implement incentives which promote the development and use of public transit and car pooling.
2. Implement incentives to encourage the use of fuel efficient vehicles.
3. Develop incentives to improve energy efficiency in freight transport.

III. Determine the feasibility and applicability of least-cost planning for Saskatchewan's long term energy planning

Action:

1. Saskatchewan Energy and Mines and SaskPower should conduct a study of the use of least-cost planning in other jurisdictions and its application in Saskatchewan.
2. Conduct the necessary research into energy service costing of energy supply alternatives to determine the economic potential of least-cost planning.

IV. Conduct research in areas relating to energy and environmental technologies to enable our industries to remain competitive

Action:

1. Priority should be placed on the following areas:
   - forecasting energy supply and demand
   - technology options for application to Saskatchewan's energy resources
   - development of potential of renewable energy forms
   - energy efficiency and conservation measures

Waste Management

Objective VI

Minimize Waste

Today's industrial economies were founded on a vast use of materials. The extraction, processing, and consumption of these materials generate wastes that can be environmentally damaging.

In the past, waste management focused on treatment and disposal as well as the search for "the technological fix." Now the focus must shift to preventative measures such as waste reduction.

Each day, Saskatchewan households, businesses, governments, hospitals, schools and other organizations generate tens of thousands of tonnes of waste. These wastes generally fall into six major categories:

1. solid non-hazardous waste that is typically collected by municipalities and disposed of in community landfills;
2. liquid non-hazardous waste that is typically disposed of in sewage systems;
3. air emissions that are generated by transportation, energy production, residential fuel consumption, etc.;
4. biomedical waste that is generated by hospitals and veterinary clinics;
5. waste dangerous goods like motor oil and dry-cleaning solvents;
6. waste generated in the processes of extracting and processing minerals.

Each of Saskatchewan's waste "streams," when managed irresponsibly, poses a potential threat to both the environment and the economy.

Environmentally acceptable alternatives for managing Saskatchewan wastes are sometimes limited and expensive. For example, more than 70 per cent of Saskatchewan's community landfills will be full within five years. Replacing landfills will be difficult and costly.

As a result, the likelihood of improper waste disposal is increased. The potential consequences of improper disposal include: ground and surface water contamination, decreased air quality, soil contamination and reduced biological diversity. These negative environmental effects ultimately affect human health.

The irresponsible management of waste and the resulting contamination of resources, either limit the commercial or public use of these resources, or raise the costs of their use by requiring the removal of contaminants.

Waste results from inefficient use of materials. Inefficient use not only depletes resources more rapidly, but it also costs more to manage the resulting larger waste quantities.

Managing Saskatchewan's wastes responsibly will protect environmental and human health, create new economic opportunities, protect future opportunities for economic activity, lower the costs of future economic activity and conserve resources.

Responsible waste management involves handling, collecting, storing, transporting, treating, and disposing of waste in a manner that protects the environment as well as human health and safety. Hazardous wastes such as biomedical materials require special disposal practices (e.g. high temperature incineration).

However, responsible waste management focuses first on minimizing waste requiring treatment and disposal. Reducing waste is usually environmentally superior and less costly than treatment and disposal.

There are four general approaches to minimizing waste, known as the "4 Rs." In order of priority they are reduction, reuse, recycling, and recovery. They are defined as follows:

1. REDUCTION: preventing or reducing the quantity or toxicity of generated waste.
2. REUSE: reusing items in their original form for their original purpose.
3. RECYCLING: using an item as a substitute raw material in producing new materials or items; and
4. RECOVERY: extracting components of an item for use in producing new materials or items.

While Saskatchewan has launched a number of waste minimization initiatives, including two Pilot Blue Box Projects, the Non-Refillable Beverage Container Collection Program, and the Ozone-Depleting Substances Regulations, the Province does not have a comprehensive and integrated approach to minimizing wastes.

Reducing waste is everyone's responsibility. Governments, industries, businesses, institutions, interest groups and individuals must all play an important role in the development and implementation of a waste minimization strategy.

Recommendations

I. The Government, in consultation with stakeholders and the general public, should develop a comprehensive waste minimization and management strategy

Action:

1. Ensure the full costs of resource extraction, manufacturing, use, and disposal are accounted for economically and environmentally.
2. Develop education and information programs to raise awareness on how to minimize waste.
3. Provide incentives, monetary and non-monetary, to encourage the use of waste minimization practices and programs.
4. Develop workable systems for handling and disposing of hazardous wastes.
5. Selectively fund research and innovation in waste minimization.
6. Where education and incentive programs do not work, impose controls and standards to curb undesirable activities and products.
7. Establish reporting requirements to measure progress toward waste minimization targets and to ensure accountability by government and producers of waste.
8. Penalize government agencies, businesses, and citizens for waste management practices which fail to comply with legislated controls and standards.

II. All Saskatchewan residents must contribute to a sustainable future through minimizing waste

Action:

1. Conserve water in home and garden applications.
2. Purchase wisely to support reduced packaging and to avoid single use disposable items.
3. Implement energy conservation measures in the home and in transportation.
4. Use home-based techniques such as reuse of grey water and composting.
5. Support community implementation of the "4 Rs."

Social Considerations

Objective VII

Protect and Promote Social Values, Cultural Identity, and Heritage Resources

Saskatchewan people can trace their roots to every corner of the globe. Our Province is a rich mosaic of cultures, values and ideas. For centuries, the Province has been the home of aboriginal peoples who lived on the land within the constraints imposed by the natural environment. Less than 200 years ago, Europeans brought their political, legal and economic systems which encouraged economic development. Since then, our population has grown close to one million. More than 900,000 of these people were born in Canada.

Diversity creates contrasting perspectives and values among differing cultures, rural and urban dwellers, developers and environmentalists, and consumers and conservers. When views are polarized, decision making becomes extremely difficult. Social diversity requires the development of decision making processes that bring people together to stress similarities, resolve differences and to move toward a sustainable society.

Features of a sustainable society:

- an open, accessible political process that puts government decision making power closest to the people who are affected by the decision
- increased public understanding and application of the concept of sustainable development

- environmental concerns incorporated directly and extensively into the political decision making process
- political boundaries do not inhibit the solution of environmental problems
- greater understanding and respect for other points of view, cultural backgrounds and needs
- development that improves our quality of life, consumes fewer resources, and promotes greater local and regional self-reliance.

Recommendations

I. Protect and conserve cultural and heritage resources

Action:

1. Implement research programs to establish an inventory and an evaluation of heritage and cultural resource features.
2. Maintain functional systems for preserving heritage resources, including legal protection, site markers, museums, archives and interpretive programs.

II. Foster opportunities for protecting and enhancing cultural diversity within the broader context of intercultural links and global citizenship

III. Promote and encourage life-affirming pursuits over those entailing greater resource consumption

Action:

1. Give priority to supporting and developing artistic, academic and recreational pursuits which rely less on consumption of materials and energy.

IV. Develop and strengthen mechanisms for participatory decision-making and individual empowerment

Action:

1. In environment-economy decision making, use consensus-based approaches.
2. Adopt decentralized methods of governing where feasible (e.g. greater local autonomy, regional planning councils, etc.).
3. Encourage development of partnerships among various sectors and interests in society aimed at improving opportunities for economic development, resource conservation and problem solving.
4. Develop opportunities for co-management of renewable resources between aboriginals and non-aboriginals.

V. Promote and facilitate the development of greater self-reliance and environmentally appropriate ways of living at the community level

Action:

1. Support and encourage activities, services and organizations that have as their aim people's direct involvement in meeting their local or regional needs.

TOOLS FOR SUSTAINABLE DEVELOPMENT

Tools for Sustainable Development

The draft Conservation Strategy prescribes nearly 150 actions which will move Saskatchewan towards a sustainable future. Successful implementation of the strategy depends on full and equal partnership among government, business, interest groups and individuals in making resource development decisions. It depends on having adequate and integrated information, investing research monies in the wisest ways, having an education plan to support sustainable development, and taking advantage of business opportunities.

The following list of tools with their brief description is not exhaustive, but rather indicative of the most critical mechanisms to advance sustainable development in Saskatchewan.

Integrated Resource Management

Several recommendations in the draft Conservation Strategy call for greater integrated decision making.

Integrated management is necessary because of the links within and between environmental and economic systems. Integrated management is a means to achieve the efficient use of resources without harming any part of the system.

While integrated management is widely recognized as essential to sustainable development, developing integrated management and planning mechanisms is a difficult task. Integrated management is a process consisting of policy formation, integrated planning and action.

We need an integrated policy to set environmental, economic and social objectives. The objectives must not be too narrowly focused so that they prevent flexibility or change. Rather, they should provide the framework for individual or social achievement. They should identify what can be achieved from developing and using our resources.

Saskatchewan's draft Conservation Strategy provides such a framework. It recognizes that development is necessary to meet our personal and social needs. The strategy also sets out a direction for development that does not destroy our primary resources of air, water and soil. It also states that all of Saskatchewan's biological diversity must be protected. In the case of non-renewable resources, the strategy states that we must not waste resources. We are obligated to future generations to minimize depletion.

Armed with a policy document that encourages integrated management, the next challenge is to develop planning mechanisms to achieve individual and social objectives. The greatest barriers are the institutional arrangements that currently exist in managing our resources. For example, in Saskatchewan water and land resources are managed by completely separate provincial government agencies. To complicate the matter, some resources are also managed between federal and provincial government agencies. In areas where municipalities exist, responsibility for managing resources is also extended to local governments.

The solution is not to create a single large resource management department. Instead, agencies must learn to work together to develop common objectives for shared resources.

Another challenge is defining planning units. This is most difficult in the settled southern portion of the province where planning is often at the municipal level in cooperation with relevant provincial agencies. This approach results in resource planning according to political rather than ecological boundaries. An ecological planning approach is necessary to achieve sustainable development.

The recent Great Sand Hills Land Use Strategy is an example in which political boundaries were not barriers to an ecological planning approach. The strategy was developed for an area that includes three municipalities. The municipalities agreed to implement the strategy by forming a planning district that encompasses the ecological boundary of the Great Sand Hills.

In contrast to the southern half of the province, the northern half is largely unpopulated and remains Crown land. Saskatchewan Parks and Renewable Resources is the dominant resource managing agency in the north. Crown land ownership and a dominant agency greatly assist integrated resource management. Lack of biophysical inventories and limited financial and human resources are probably the greatest barriers to more integrated resource management in the north.

The current process of Forest Management License Agreements for managing the commercial forest zone is important in promoting integrated resource management. If these agreements were prepared with input from all relevant forest users, they could serve as integrated management plans. The provincial government should be responsible for integrated plans in the non-commercial forest zones as resources allow.

Saskatchewan's river basins also need to be managed in an integrated manner. The Qu'Appelle Basin Study in the early 1970s was an excellent example of integrated management. The Qu'Appelle Basin has 10 major tributaries and it covers about 51,000 square kilometres. The study examined water quality and quantity, land and water use, and flooding. The study involved public consultation and decisions were made from reliable data. The Qu'Appelle Basin Study should be used as a model for the integrated management of our river basins. The recently completed South Saskatchewan River Basin Study provides another example of planning for multiple interests.

Saskatchewan has several examples of an integrated management approach to manage resources to achieve multiple objectives. These examples should form the foundation for improved integrated management.

To advance integrated management we need commitment and resources from all levels of government and coordination among agencies.

The Conservation Strategy should provide the framework and the momentum to achieve an integrated approach to managing Saskatchewan's resources. Without integrated management, sustainable development will not be achieved.

Monitoring and Information Management

Monitoring

Environmental monitoring is the collection of data as part of day-to-day activities in government and business, scientific and research communities. Data are evaluated and used for many purposes: to understand how resources are interrelated, to find out the effects of development, to protect biological diversity in the province and so on.

The Conservation Strategy provides direction to better protect and manage our resources, but adequate information is not always available. Data collected by government, researchers and scientists are often not broad enough for assessing sustainability. Some databases are out of date. To gauge the Province's progress toward sustainable development, we need to improve environmental monitoring.

Sustainable use of resources requires knowledge to measure all aspects of use and development. Environmental indicators are probably more manageable than complete databases.

In addition to providing clues to trends in resource use, indicators could also be used to assess the impact of policies and programs on sustainable development. Indicators that show resources are being depleted faster than they can be replenished would signal a need to evaluate policies and programs in a particular area.

Information Management

The Conservation Strategy recommends integrated planning for sustainable development. This requires development and maintenance of many databases that can be linked to each other. Two major information management initiatives are currently under way in Saskatchewan — the development of a Geographic Information System Data Base Management Model and the establishment of a Nature Conservancy Data Centre.

Geographic Information Systems (G.I.S.) are software systems that manage geographical information, such as vegetation cover and the location of features such as roads and rivers. G.I.S. can help managers and planners to efficiently analyze comprehensive sets of data. Led by the provincial Central Survey and Mapping Agency, Saskatchewan is compiling G.I.S. with a Data Base Management Model. The key elements are establishing standards to ensure compatible data generation and distribution, and the production of a set of base maps which can be owned and managed by separate users. G.I.S. should be used in Saskatchewan to manage agricultural lands and watersheds. It is already being used to manage some of Saskatchewan's forested areas.

Establishment of a Nature Conservancy Data Centre will be important in protecting biological diversity in Saskatchewan. When the centre is operational, data on rare, threatened, or endangered species and ecosystems will be collected and centrally stored. A company planning a pipeline, for example, could quickly find the nesting locations of burrowing owls to determine appropriate routing and construction periods.

Environmental Assessment

To make economic activities both environmentally and economically sustainable, we must improve the environmental assessment process. Detailed assessments of the environmental, economic and social effects of development proposals and major policies will require a more open process. The current environmental assessment process will have to be modified.

The Saskatchewan Round Table sees the need for modifications relating to independence, breadth and depth of involvement, information availability, comprehensiveness, fairness and reliability.

Independence

The assessment process should be independent. Administrators are able to function best if they are free from outside influences and biases.

Involvement

The Round Table has demonstrated the value of involving "significant" stakeholders or interested parties in economic and environmental decisions that affect them. It also shows that stakeholders include those with differing interests, not just those with like interests, and the need for talking face-to-face, not just supplying information. Only decisions made openly and based on consensus are likely to be sustainable.

Information

The productive resolution of diverse interests can happen only in a spirit of trust, and confidence in the process. Trust grows when adequate information is available and shared among stakeholders and the public.

Comprehensiveness

Assessments must be conducted on a broad enough basis to encompass all major areas concerning sustainable development — environment, economics and social considerations. Assessments should be conducted on a cradle-to-grave basis, dealing with conception, planning, construction, operation and closing. They should also consider local, regional and global effects.

Fairness and Reliability

The assessment process must be fair for all competing interests. Reliability also means harmonizing the environmental assessments of different governments.

Policies and Programs

Occasionally, governments implement policies and programs to serve one interest at the expense of another. To ensure a sustainable future, all interests must be considered in policy and program solutions. Poor policies have led to practices that are harmful to the environment. Certain policies and programs should be scrutinized for adherence to the principles of sustainable development before acceptance and implementation.

Recommendations

- create an independent assessment process
- build the assessment process on a foundation of broad and in-depth public and stakeholder involvement
- make information about the assessment process and the specific deliberations within the process more available

- ensure that the assessment process is comprehensive in content, time and space
- ensure that the assessment process is fair and reliable for all participants and harmonize processes among governments
- ensure that policies and programs that affect the sustainable development of our resources are scrutinized during formulation
- apply Conservation Strategy objectives and the principles of sustainable development to all assessment activities

Research

Research, both basic and applied, is the engine that drives scientific, technological, and economic advances over the long term. Research is a double-edged sword in the context of sustainable development. On one hand, the products of research and development have caused much of today's environmental damage and pollution. On the other hand, research can help remedy the damage or, more importantly, prevent it.

It is necessary to set priorities for sustainable development research in order to maximize the return from scarce funding sources. Saskatchewan should channel research funding to areas that will have the greatest effect on the province's future economic and environmental sustainability and fund relevant projects not being researched in other jurisdictions.

Of all economic activities, agricultural production continues to have the greatest impact on the Saskatchewan environment in terms of soil, water and wildlife resources. Traditional agricultural production is under economic and environmental pressure to undergo fundamental change to overcome threats to the long term sustainability of the province's agriculture and food systems. Research in support of sustainable agriculture must consider the following issues:

1. Soil degradation – the loss of fertility and organic matter; increasing salinity; wind and water erosion.
2. Water quantity, quality and pollution – the availability and suitability of a reliable water supply are major constraints for many individual farms, rural communities and enterprises.
3. Impacts of global warming on all aspects of agriculture.
4. Increased use of genetic resources.
5. Competing requirements for land use – flora and fauna habitat, the urban and rural interface, and the alternative use of agricultural lands.

In Saskatchewan, water resources are finite. Everyone has the responsibility to use water efficiently and to maintain its quality. We must learn to use our water better and to save it in times of over-supply for times of shortage. The following research areas have been identified for sustainable water management:

1. Water conservation strategies.
2. Maintenance or enhancement of water quality.

Consensus Building

Across Canada and within Saskatchewan conflicts are increasing over resource use as more people want to use limited resources for a greater number of purposes. Conflicts challenge traditional decision making processes and many decisions are protested, appealed or ignored.

Misgivings are growing over governments' abilities to account adequately for competing interests. Appeal processes, court cases and civil disobedience are costly, psychologically and spiritually draining and often destabilizing.

Conflicts have been growing, not only because of increasing demands for resources, but also because of a narrow approach to decision making. We have been hesitant to broaden involvement at the conceptual and planning stages or even at construction and operation stages of major projects. All too often, projects are undertaken with the participation of only those who have similar interests. Conflicts are then faced only when many options have been foregone.

The Round Table demonstrates the value of a full and open declaration of diverse interests and needs early in the consultative process. Declaration, along with the separation of needs from wants, a willingness to acknowledge the needs of others, and the development of trust where none existed before, opens the door to a consensus-building process. Consensus is more likely to result in implementation of decisions to achieve sustainable development.

Consensus differs from other approaches to decision making. Consensus is a general agreement among participants on a package of provisions that addresses an entire issue. Participants may not agree with all the elements of a successful consensus decision but there is enough of what they need in the package to allow overall acceptance.

However, consensus is just one part of a comprehensive decision making system. Other means of making decisions are needed when resolution by consensus is not appropriate, or when attempts to reach a consensus fail. These alternatives are called fallbacks.

Fallbacks are measures for reverting to majority rule or referring an issue to a higher authority. Fallbacks make consensus processes work because they are often less desirable than a consensus. Participants usually prefer to arrive at a decision themselves than to turn a matter over to some other party. Fallbacks must be clearly defined before a consensus process begins because they are often a major incentive for concluding a consensus.

A consensus decision is time consuming, costly and frustrating. However, unilateral decisions that appear to be quick and efficient often result in time consuming appeals and court action.

Consensus building must be our primary decision making approach to ensure that environment-economy integration works in Saskatchewan.

Education

A sustainable future in Saskatchewan must include a healthy environment, a healthy economy, and healthy lifestyles for its citizens. A sustainable future depends on awareness and commitment to improve lifestyles, economics, and the environment.

Advisory committees from 11 sectors identified the need for education about sustainable development. Consequently, the Saskatchewan Round Table established the Education Advisory Committee in March 1991. The committee is comprised of 22 representatives who have been asked to prepare an education plan to support sustainable development in the province.

Because the committee's work is in progress, it is not reflected in the draft Conservation Strategy. The final Conservation Strategy will incorporate principles of sustainable development education. The details of the education plan will be available to the Round Table in the Education Advisory Committee's final report.

Business Opportunities

Saskatchewan businesses are responding to concern about the environment. This concern can be seen in the increasing number of "green" products available on the store shelves, and in the participation of this sector in recycling and reuse initiatives. Individual businesses are increasingly willing to reduce their consumption of resources and to consult with individuals and interest groups during their decision making processes.

This response is occurring for a number of reasons. Business people, like everyone else, are recognizing the seriousness of the threats to our environment and they share the concern for the planet's well-being. They see that they have a role to play in sustaining our planet's future.

Businesses feel the pressure of the public's demand for environmentally-responsible behavior. The public now holds businesses directly accountable for any environmental consequences of their activities. Businesses feel the effects of consumer buying habits which have increasingly reflected preferences for environmentally-friendly products.

Conservation of energy, water and other resources is a big saving for any business operation. Reduction in any waste "stream" means decreased treatment or disposal costs. Some wastes can be converted to products with considerable value in the marketplace.

Environment-economy integration offers Saskatchewan's business sector considerable opportunity for growth in the following areas:

- environmental expertise and advice
- pollution control and monitoring equipment
- information services
- recycling
- groundwater treatment technologies and equipment
- value-added processing

In addition, there are economic activities that have relatively few environmental consequences and that may provide an area for growth. Examples may be found in the communication and information industries.

Saskatchewan's Conservation Strategy prescribes new ways of undertaking existing economic activities in the province to make those activities and their generation of wealth more sustainable. Continuing economic health will require that we grasp environmentally-friendly business opportunities and make them work for us.

Appendix A

Saskatchewan Round Table Members

Frank Arnie, Co-Chairperson

- past president of the Saskatchewan Wildlife Federation and former director of the Canadian Wildlife Federation.

Jon Gillies, Co-Chairperson

- Agricultural Engineering professor at the University of Saskatchewan, chairperson of the Saskatoon Chamber of Commerce Water Resources Committee, past-president of Canadian Water Resources Association, and editor Canadian Water Resources Journal.

Doug Chekay

- provincial manager of Ducks Unlimited Canada, and vice chairperson of the Saskatchewan Wetland Conservation Corporation.

Chief Roland Crowe

- Chief of the Federation of Saskatchewan Indian Nations, who has also served three terms as the Federation's second vice-chief.

Bill Gaynor

- vice president and general manager of the Saskatchewan Division of Weyerhaeuser Canada Ltd., a Saskatchewan Chamber of Commerce director, and director of the Saskatchewan Chapter Canadian Council on Native Business.

Honourable John Gerich

- Associate Minister of Economic Diversification and Trade, Minister Responsible for the Saskatchewan Liquor Board and Liquor Licensing Commission, and director of the Saskatchewan Property Management Corporation.

Dr. David Henry

- professor of Environmental Design at the University of Calgary, past president of the Canadian Parks and Wilderness Society, and author of Red Fox.

Dr. Stuart Houston

- professor of Radiology with the University of Saskatchewan's Medical Imaging Department, and past president of Saskatchewan Natural History Society.

Sister Phyllis Kapuscinski

- member of the Faculty of Education at the University of Regina, National Science Teachers Association and the National Association for Research in Science Teaching.

Honourable Lorne Kopelchuk

- Minister of Saskatchewan Parks and Renewable Resources, and Minister Responsible for the Saskatchewan Wetland Conservation Corporation.

Honourable Beattie Martin

- Minister of Saskatchewan Environment and Public Safety, Minister of the Family, Minister Responsible for Seniors, and Minister of the Public Service Commission.

Honourable Ray Meiklejohn

- Minister of Saskatchewan Education, Minister Responsible for the Status of Women, Teachers' Superannuation Commission, Meewasin Valley Authority, and vice chairperson of the Saskatchewan Communications Network.

Lindsay Milne

- represents the Canadian Petroleum Association, senior vice-president of Bow Valley Industries, and past president of the Canadian Institute of Mining and Metallurgy.

Ken Naber

- farms at Melfort and operates Naber Seeds Ltd., Reeve of the R.M. of Star City, past president of the Saskatchewan Canola Growers Association, and past president of Focus on Inputs Association.

John Nightingale

- president of the Cigar Lake Mining Corporation, chairperson of the University of Saskatchewan Board of Governors, and chairperson of the Saskatchewan Mining Association Environmental Committee.

Bert Weichel

- an environmental consultant and past president of the Saskatchewan Environmental Society.

Previous Members of the Saskatchewan Round Table:

Beverly Brennan, vice-president, Philom Bios

Joan Duncan, former Minister of Economic Development and Tourism

Bill Duke, farmer and representative of Western Canadian Wheat Growers

Grant Hodgins, former Minister of Environment and Public Safety

Darla Hunter, former lawyer with MacPherson, Leslie and Tyerman

Austin Jagoe, former United Church Minister

Colin Maxwell, former Minister of Parks, Recreation and Culture

Herb Swan, former Minister of Environment and Public Safety

Appendix B
Glossary

Abandonment of Reclaimed Lands: occurs when a development company has completed reclamation of disturbed lands and returns ownership and responsibility for the land to others.

Ancestor Plants: are the original forms of domestic plants. For example, wheat varieties have been developed through plant breeding from wild wheat plants.

Biological Diversity: means the wealth of life forms found on earth – millions of different plants, animals and micro-organisms, the genes they contain, and the intricate ecosystems they form.

Biophysical Area: refers to all living organisms and landscape features that are present in an area.

Chlorofluorocarbons(CFC's) and Halons: are man-made chemical compounds or gases which undergo change in the upper atmosphere, destroying atmospheric ozone.

Cogeneration: is the integration of heat recovery and energy generating systems to produce electricity.

Conservation: is the wise use of natural resources to provide sustainable benefits.

Conservation Strategy: is a plan that provides direction to use Saskatchewan's resources wisely to achieve sustainable development.

Contaminant: see pollutant.

Cross Compliance: is the establishment of farm management plans in exchange for the ability to participate in government programs.

Crown Land: is land that is owned by the federal or provincial government.

Decommissioning: is putting an operation such as a mine out of service.

Ecological Forest Management: is managing the forest in a manner such that the forest can sustain itself over time, without loss of production or biological diversity.

Ecological Management: is an approach that attempts to manage resources respecting the laws of nature. If ecologically managed, renewable resources will sustain themselves over time.

Economy: is a system of managing production, distribution and consumption of goods and services.

Ecosystems: consist of communities of plants, animals and micro-organisms along with the air, water, soil and other elements. Ecosystems are subdivisions of the environment.

Effluents or Emissions: are discharges of pollutants into the environment, partially or completely treated.

Endangered: the existence of a particular species in Saskatchewan that is threatened with immediate extinction.

Environment: everything that affects an organism during its lifetime is collectively called its environment. The environment is soil, rock, water, air, along with living organisms.

Environmental Degradation: is defined as reducing the ability of the environment to sustain the health, productivity, or stability of ecosystems.

Environmental Audit: is an investigation and evaluation of policies, programs and actions to determine their environmental implications.

Extirpated: refers to species that no longer live in the wild in Saskatchewan.

Flora and Fauna: flora are all species of plants; fauna are all species of animals.

Fossil Fuels: are fuels that were formed from the remains of living things, primarily petroleum, natural gas and coal.

Integrated Pest Management: is the selection of the most appropriate pest management combinations including biological control (e.g. pest predators), cultural control (e.g. crop rotation) and using pest-resistant crops. Chemical pesticides can be used selectively in support of non-chemical means of control.

Integrated Resource Management: is a process that ensures all interested or affected parties have an opportunity to be involved and informed in protecting, developing and managing resources.

Invertebrates: refers to all animals that do not have a spinal cord.

Micro-organisms: is any organism that can not be seen without the aid of a microscope.

Multiple Land Use: refers to more than one use of a particular area. For example, a community pasture may be used for grazing, hunting, and oil production.

Non-renewable Resources: are resources whose reserves are depleted by their use, such as natural gas and oil.

Organic Farmer: is a farmer that produces agricultural products without synthetic fertilizers, pesticides or other such products.

Organisms: are any living things – plants, animals and micro-organisms.

Pesticides: are all man-made products that are used to kill particular organisms. These include insecticides, herbicides and other biocides.

Pollutant or Contaminant: is any introduced gas, liquid or solid that degrades or destroys natural resources.

Pulse Crops: are legume crops, such as peas, which are harvested as dried seeds suitable for human consumption.

Reclamation or Rehabilitation: is restoring a disturbed site to a desired condition within a specific period of time.

Renewable Resources: are resources that if properly managed can be renewed over time, such as forests and wildlife.

Soil Degradation: means the loss of soil productivity, resulting from erosion or other factors that affect soil quality.

Solar Cells: is an energy converter that stores sunlight as electricity.

Stakeholders: are individuals or groups that are interested or involved in a particular business, industry or cause.

Strategy: is a process of setting goals and objectives, and determining ways to achieve them.

Sustainable Development: is the result of social and economic development that considers the needs and values of all interested parties, while maintaining future options and conserving natural resources and diversity.

Sustainable Energy Path: is a plan for the gradual replacement of non-renewable energy sources with renewable ones. It also involves conservation of non-renewable resources.

Sustainability: refers to the ability to sustain a resource over time. For example, sustainable deer management is such that deer may be harvested at rates that allow deer populations to rebuild themselves.

Threatened: species that are likely to become endangered if factors affecting them are not reversed.

Transboundary Approach: is a cooperative approach among jurisdictions to manage and protect resources, such as air quality.

Ultraviolet light: is a high frequency light.

Vascular Plants: are plants that have tubes or ducts which transport water and other substances from one part of a plant to another.

Vertebrates: refers to animals that have a spinal cord and cranium or skull.

Vulnerable: species that exist in low numbers or live in restricted areas in Saskatchewan, and may, therefore, be prone to becoming threatened or extinct.

Waste Minimization: means managing wastes by practising, in order, the "4 Rs" of reduce, reuse, recycle and recover.

Conversions

acres = hectares x 2.471
inches = millimetres x 0.04
square miles = square kilometres x 0.387